Broadband Cost Model

Insular Area Broadband Network Economic Cost Simulation for the U.S. Virgin Islands

Prepared for

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By

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Executive Summary of Broadband Cost Model: U.S. Virgin Islands

Virgin Islands Telephone Corporation ("Vitelco") d/b/a Innovative Telephone Vitelco, a price cap-regulated incumbent local exchange carrier serving the territory of the United States Virgin Islands ("USVI"), submits herewith a USVI Broadband Cost Model ("USVI BCM") for review by the Federal Communications Commission's Wireline Competition Bureau ("WCB" or "Bureau"). The accompanying USVI BCM demonstrates that the Connect America Cost Model ("CACM") currently under consideration by the WCB does not adequately reflect the unique operating conditions that cause the cost characteristics of Vitelco's operations in an area non-contiguous to the U.S. mainland to vary significantly from those of mainland LECs, the characteristics of which largely form the basis for the CACM's cost calculations and the related CAF Phase II support calculations. As a result, the CACM's cost calculations and the related CAF Phase II support calculations seriously understate Vitelco's actual costs and the related CAF Phase II support calculations would fall far short of providing sufficient support for Vitelco to implement and maintain broadband services with the scope and scale contemplated by the Federal Communications Commission ("FCC" or "Commission").

In its Connect America Fund Report and Order and Further Notice of Proposed Rulemaking, the FCC specifically addressed the issue of support for insular areas. The FCC directed the Bureau "to consider the unique circumstances" of Alaska, Hawaii, Puerto Rico, the U.S. Virgin Islands and Northern Marianas Islands "when adopting a cost model." The FCC further directed the WCB, "to consider whether the model ultimately adopted adequately accounts for the costs faced by carriers serving these areas." If the model adopted by the WCB does not meet this test laid down by the FCC for insular areas, "the Bureau may maintain existing support levels, as modified in this Order, to any affected price cap carrier, without exceeding the overall budget of $1.8 billion per year for price cap areas."[1]

To date, three models have been submitted by interested parties to set funding under the second phase of the Connect America Fund ("CAF II"). First, a coalition comprised of the largest price cap carriers serving the U.S. mainland sponsored the CQBAT model, which, as discussed below, formed the basis of the CACM. The other two models were provided by insular carriers, each of which included costs

[1] *See ¶193 of In the Matter of Connect America Fund A National Broadband Plan for Our Future Establishing Just and Reasonable Rates for Local Exchange Carriers High-Cost Universal Service Support Developing an Unified Intercarrier Compensation Regime Federal-State Joint Board on Universal Service Lifeline and Link-Up Universal Service Reform – Mobility Fun*, WC Docket No. 10-90, GN Docket No. 09-51, WC Docket No. 07-135, WC Docket No. 05-337, CC Docket No. 01-92, CC Docket No. 96-45, WC Docket No. 03-109, WT Docket No. 10-208, Report And Order And Further Notice Of Proposed Rulemaking, FCC-161 (2011).

specific to the submitting carrier's service area that were not reflected in the CQBAT model: Alaska Communications Systems ("ACS") submitted a model that estimates the cost of microwave, satellite and undersea cable transport facilities required in Alaska that were not included in the CQBAT model, while Puerto Rico Telephone Company ("PRT") submitted a model that estimates the total costs of providing broadband and voice services to Puerto Rico, including undersea cable transport facilities to the nearest Internet peering point in the U.S. mainland and other costs that were not included in the CQBAT model. In this submission, Vitelco, as discussed in detail below, provides a forward-looking broadband cost model that more accurately captures the costs of providing broadband and voice services in its own territory, the U.S. Virgin Islands.

On December 11, 2012, the WCB announced that Version 1 of the CACM was available for review by parties to this proceeding, subject to the execution of protective orders. As described by the Bureau and in the CACM's documentation, the new model is an updated version of the CQBAT, albeit with certain enhancements, including the inclusion of costs associated with voice service. On January 17, 2013, the Bureau announced the availability of CACM Version 2, which incorporated additional enhancements, including the use of: 1) 2010 census boundaries and December 2011 National Broadband Map data; 2) the latest available version of GeoResults wire center boundaries; and 3) updated consumer location and business location counts. The Bureau subsequently announced, on March 13, 2013, the availability of CACM Version 3 that incorporated updated demand data, revised network topology to take into account the updated customer locations, and the capability to identify census blocks shown in the June 2012 National Broadband Map as unserved by Wireline telecommunications, cable, and fixed wireless providers offering speed levels of 3 Mbps downstream and 768 kbps upstream. Most recently, the Bureau released CACM Version 3.1 that enables adjustment of the assumed take rate from 90 percent to 80 percent, makes minor adjustments to certain operating expense values, revises the default assumptions for plant mix, incorporates variables for fixed wireless coverage and updates the TecloMaster table with corrected holding company data. -.

Based on a review of the available documentation of these versions, the CACM in its current form does not include any of the additional measures or data related to insular areas that would enable the model to capture realistically the costs of providing broadband in the non-contiguous areas served by price cap carriers. As noted above, the CQBAT model on which the CACM was based already understated insular carriers' costs because it simply omitted key cost factors that uniquely affect insular carriers. But the

support results for the U.S. Virgin Islands produced by the CACM are even *lower* than what was calculated by the CQBAT. The ineffectiveness of the CACM to accurately estimate operating costs in a non-contiguous area such as the U.S. Virgin Islands is evident even upon a cursory review of CACM Version 3.1 results as presented in the model's Cost Investment Detail report option. The bottom line is that the CACM (using the base solution set for the U.S. Virgin Islands released with Version 3.1), calculates that the total network investment required for a 4Mbps downstream/1Mbps upstream broadband network in the U.S. Virgin Islands is only $73.4 million[2]. In contrast, the more accurate USVI BCM submitted herewith estimates a total investment requirement of more than $177 million, or nearly two and one-half times that identified by CACM Version 3.1.

When the inputs are considered, this failure of the CACM to capture Vitelco's true costs is not surprising. As addressed in Vitelco's pleadings and ex parte filings in this proceeding, the CACM fails to incorporate many of the actual cost and operational characteristics that impact the provision of voice and broadband services in the U.S. Virgin Islands. Examples of such characteristics include:

(a) *higher broadband middle-mile costs.* Vitelco's nearest Internet peering point is in Florida, resulting in substantial additional cost to backhaul traffic to Florida across more than 1,000 miles of ocean;

(b) *higher shipping-related costs*: All supplies necessary for creating and maintaining a telecommunications infrastructure must be shipped and stored at considerable expense, and the company must maintain larger inventories of supplies and equipment on-site due to shipping times. Moreover, to reduce repair and provisioning times to acceptable levels, inventories must be maintained on each of the major islands rather than at a centralized location;

(c) *higher procurement costs* arising from customs duties, excise taxes and procurement restrictions. Here, it is important to note that that the USVI is outside the US Customs Zone and is subject to import duties on equipment and supplies to which other carriers modeled by the CACM are not subject.

(d) *higher operational costs associated with USVI topography*: The islands' terrain is rocky and hilly, resulting in added difficulties and cost of deploying facilities. In addition, there is heavy tropical

[2] Cost Investment Detail, Solution Set: SS20130426CAM31Base SBI CblVoiceFW, Telco Master Table: Geo ResultsQ42012_SMK7v2, Short Name: VIT, State: VI.

vegetation in sparsely populated inland areas, which makes the use of underground or buried cable expensive;

(e) *higher operational costs associated with the warm tropical climate* of the USVI, which lead to an enhanced need for environmental protection for telecommunications equipment and infrastructure;

(f) the *frequent tropical storms and severe hurricanes* in the Caribbean, which often cause extensive damage to existing telecommunications infrastructure, resulting in higher costs of repair and maintenance; and

(vii) the *high level of airborne salt* from the ocean, which leads to accelerated corrosion and deterioration of telecommunications equipment and infrastructure.

With this submission, Vitelco provides to the Bureau a broadband cost model that, unlike the CACM, does incorporate the actual cost characteristics discussed above, as well as other relevant factors, and thus provides a more realistic view of the operating costs that would be incurred in the provision of voice and broadband services to the U.S. Virgin Islands using an economically efficient and forward-looking network.[3] As has been noted in Vitelco's pleadings in this proceeding, this cost model is being presented for the purpose of demonstrating that the CACM as currently designed does not adequately account for the unique cost factors affecting non-contiguous territories such as the U.S. Virgin Islands. For the reasons discussed below, it is not being proposed at this point as an alternative model for the purpose of calculating specific amounts of Phase II support to be distributed.

In the interest of accuracy, efficiency and cost effectiveness, the USVI BCM's cost results and the resulting support calculations depart somewhat from the output granularity designated in the Commission's December 15, 2012 Public Notice, Request for Connect America Fund Cost Models ("Notice"). Specifically, Paragraph 6 of the Notice specifies that models submitted for consideration by the Bureau as a basis for estimating broadband costs and the attendant CAF II support "should be capable of estimating the forward-looking economic costs of an efficient wireline provider at a granular

[3] The USVI BCM incorporates the characteristics of an efficient, forward-looking network structures that includes a larger underground portion of the loop distribution structure mix (80% aerial and 20% underground) in order to improve reliability and lower outside plant maintenance expenses. To account for these lower expenses and as described in sections below, the annual charge factor for maintenance is adjusted downward from actual maintenance expense/plant asset ratios.

level—census block or smaller…" As a threshold matter, as noted previously, the USVI BCM is not being submitted for consideration as a basis in itself for determining CAF II support levels, but rather to present a realistic demonstration of the costs of providing broadband in the U.S. Virgin Islands to show that the CACM support levels are inadequate. Thus, as a procedural matter, the granularity provisions of the Notice do not apply. To provide a demonstration of the inadequacy of CACM support levels in an accurate, efficient and expeditious manner, the USVI BCM calculates per-subscriber costs using a Greenfield approach for each of the 246 nodes that are being incorporated by Vitelco into a hybrid fiber-coaxial network as part of a territory-wide network modernization program, rather than per Census block. By using this per-node methodology, the model incorporates the actual network design characteristics and capital requirements of an "economically efficient" and "forward-looking" network that is being implemented by Vitelco.

An additional adjustment is found in the model's use of the HFC technology actually being deployed by Vitelco rather than the technologies included in the CACM: fiber to the premises and fiber-fed digital subscriber line. The decision by Vitelco's management to deploy HFC technology in the U.S. Virgin Islands was the result of extensive evaluations of available technologies and included consideration of the Territory's current and expected demographics and the considerable cost efficiencies and operational synergies of combined broadband data, voice and video operations. HFC technology is more cost effective than alternative technologies in an insular operating territory such as the U.S. Virgin Islands. Thus, its use in our model, as compared to fiber to the premises and fiber-fed digital subscriber line, not only reflects a more accurate assessment of Vitelco's costs, but also is more conservative, resulting in a lower support requirement than if fiber to the premises or fiber-fed digital subscriber line were used.

The use of the actual node-based HFC network for purposes of the USVI BCM both is more accurate in this instance and eliminates the need to incur the additional cost of designing and implementing a cost model on an entirely theoretical basis, as would be required under the census block granularity designated by the Commission and the FTTP technology platform recently chosen by the Bureau for the CACM. Mapping the (known) costs per node to a (theoretical) cost per census block would necessitate idealized allocations of costs to census blocks and, because geocode information is largely unavailable for the USVI, a purely theoretical determination of customer locations. By contrast, the USVI BCM's use of actual network design parameters and related network walkout measures enables the model to

reflect the actual physical locations of USVI customer locations. Consequently, the USVI BCM can more accurately estimate the costs per subscriber location on a network-wide basis. This approach enables Vitelco to incorporate real world network design requirements, costs of equipment and facilities, installation costs, engineering and planning costs, etc., into the model's results.

The node-based approach incorporated into the USVI BCM enables Vitelco to provide realistic cost estimates without incurring the high costs of complex theoretical modeling, which would in any case *reduce* accuracy for the reasons set forth above. As an incumbent price cap LEC serving an insular area that has lost nearly 30% of its access lines over seven years, Vitelco can ill-afford the incurrence of unnecessary costs in for the development and implementation of a purely theoretical cost model, especially when a more accurate approach is available at less cost. Consequently, the accompanying USVI BCM provides the Bureau a more accurate picture of the cost and operating conditions in the USVI at a lower cost to Vitelco than would be incurred to comply fully with the designated granularity parameters of the Commission's Notice and with the network technology platform chosen by the Bureau. Further, since the CAF Phase II support rules require a state-wide election by each price cap ILEC that wishes to participate, comparison of the model results at the state-wide (or Territory-wide) level is all that is necessary for the Bureau to determine whether the CACM adequately reflects the cost of serving an insular territory.

Vitelco's observations regarding the inaccuracy of the CQBAT and CACM models with respect to the provision of voice and broadband services in the USVI are addressed in the Company's pleadings and will not be restated here. Rather, the focus of the USVI BCM and this accompanying documentation is to provide the Bureau with a more accurate view of the costs of broadband provision in the USVI. While the USVI BCM includes calculations of CAF II support using a cost per subscriber served by Vitelco's 246 nodes, the more important purpose of this effort is to present a more realistic measure of the network investment required to meet the Commission's public policy goals with respect to the provision of high quality broadband services and the increased penetration of these services within the U.S. Virgin Islands.

Overview of Broadband Cost Model: U.S. Virgin Islands

The USVI Broadband Cost Model is a forward-looking broadband cost model with inputs specific to the U.S. Virgin Islands used to determine the cost of providing broadband in the Territory. The model includes the investment for last and middle mile segments and access to the nearest Internet peering point in the continental United States.

The model is composed of two separate excel files that link together. The files are:

- **USVI BCM RESULTS**
- **USVI BCM LAST MILE**

In order for the model to function properly these two files must be placed in a directory labeled USVI BCM on the C drive -- (C:/USVI BCM).[4] The two files work together to develop the cost of providing broadband in the U.S. Virgin Islands. The first file, USVI BCM RESULTS, is an umbrella file that contains the toggles and user-adjustable inputs to manage the model. In addition, the USVI BCM RESULTS file pulls in the results from the USVI BCM LAST MILE file and compiles them to develop the total investment, operating costs and support levels for the U.S. Virgin Islands. The USVI BCM RESULTS file also has a series of spreadsheet tabs that calculate the costs for the middle mile segment and for Internet access. The tabs for Internet access calculate the costs for the U.S. Virgin Islands to connect to the nearest Internet peering point in Florida. The set of tabs for the middle mile segment includes the cost of the equipment and facilities to connect the serving wire centers to the cable landing stations. This includes the investment associated with 1) session border controllers; 2) provisioning servers; 3) the transmission equipment used to connect the Internet core facilities to the cable stations; 4) softswitch facilities 5) all associated fiber transport facilities from the serving wire centers through to the cable stations; and 6) switches and core routers located at cable stations. The second file, USVI BCM LAST MILE, develops the investment to connect customer locations in the U.S. Virgin Islands to the hybrid fiber-coaxial ("HFC") network HUBS and to the serving wire centers. This includes the investment for cable, structures, multimedia termination adapters, drops, and connecting electronics. Put together, these two files determine the cost of providing broadband in the U.S. Virgin Islands.

[4] The two USVI BCM files can be used in other directories but the user must ensure that the files are linked properly within the same subdirectory.

Broadband Cost Model: USVI BCM RESULTS File

General Description:

The USVI BCM RESULTS file is the main overview file for the USVI Broadband Cost Model. The file contains toggles and user adjustable inputs that flow elsewhere in the model to calculate individual components of broadband cost such as customer connection or last mile, middle mile transport and internet access. The results of these calculations then flow into the USVI BCM RESULTS file where they are combined to determine the total investment, operating cost and support levels for the U.S. Virgin Islands.

Specific Description: [5]

Tab "Results"

Description: "Results" displays the investment and support levels that result from the toggles and user adjustable inputs selected. No inputs are included in this tab.

Calculations: "Results" calculates the annual broadband support, the total network investment, the investment for supported locations, the total locations and the total supported locations, the average support and investment per supported location, the total investment for the last mile, transport COE and CWF, and the annual expense figures for inter-island transport, cable station collocation and access to the nearest Internet peering location.

Tab "Toggles & User Adjustable Input"

Description: "Toggles & User Adjustable Input" contains the toggles and user adjustable inputs for the cost model. Toggles allow users to determine specific model criteria such as the upper and lower bounds for the range of costs to be supported under CAF II. The default values of the toggles are set at $80 and $256 – the same values as found in the default version of CQBAT and CACM. Other toggles allow for the adjustment of variables such as:

- the broadband customer take rate;
- inclusion of the presence of broadband competitors in specific Nodes;
- network-related parameters, including distance between splice boxes/manholes on transport routes, feeder and loop distribution routes, adjustment to pole quantities to reflect aerial/underground structure percentages and average distance between poles for transport routes;
- allocations of the costs of facilities jointly-used by broadband/voice applications and non-supported services such as video and private lines; and
- financial inputs related to the cost of capital, economic life of assets and asset salvage values.

Calculations: "Toggles & User Adjustable Input" contains no calculations.

[5] As a general guideline, blue color coding in the model indicates an input and green color coding indicates a calculation.

Tab "Broadband Cost"

Description: "Broadband Cost" combines the monthly cost for the last mile, middle mile and internet access for a total broadband cost per Node and the support level for the qualifying subscriber locations in each Node.

Calculations: "Broadband Cost" contains the following calculations:

- Total Cost (Cells K9:K253): Sums the loop, middle mile electronics, middle mile transport, collocation, inter-island transport and internet access monthly costs to determine the total monthly cost for broadband by Node.
- Subscribers (Cells M9:M253): Calculates the number of broadband subscriber locations by Node based on the broadband service take rate.
- Support (Cells O9:O253): Determines the CAF II support amount, if any, received for the qualifying subscriber locations by Node. The formula first checks to see if the unsupported broadband competitor toggle is on and if there is an unsupported broadband competitor. If both of those are true, then the Node receives zero broadband support. If not, then the model compares the monthly cost amount to the upper and lower bounds. Should the monthly cost fall outside the bounds, then the support is once again zero. However, if the monthly cost falls within the upper and lower bounds, then the model calculates the annual support amount for the Node. The annual support amount is determined by subtracting the monthly cost for the Node from the lower bound, then multiplying the result by the number of subscribers[6] and annualizing for 12 months.

Broadband Cost Model: USVI BCM RESULTS File: Middle Mile

General Description:

The Middle Mile portion of the USVI BCM represents the investment from the serving wire centers up to the cable landing stations in the U.S. Virgin Islands, as well as certain termination equipment at network HUBs. The Middle Mile central office equipment includes the investment associated with 1) Metaswitches, 2) Ethernet switches, 3) Session border controllers, 4) Incognito provisioning servers, 5) cable modem termination equipment, and 6) wavelength-division multiplexing equipment ("WDM"). Middle Mile cable and wire facilities ("CWF") include fiber plant and structure facilities used for inter-office routes, including transmission facilities connecting to and located at the cable landing stations on St. Thomas and St. Croix.

In addition, Middle Mile costs include the lease costs associated with inter-island transmission routes that, under a Greenfield analysis, would be purchased from third-party providers in the U.S Virgin Islands. There are both existing and proposed inter-island broadband facilities and recent price proposals have established a market price benchmark of $35 per Mbps per month. Under a Greenfield

[6] Subscribers are determined by multiplying the total customer locations eligible to receive support by the user-adjustable take rate.

approach Vitelco believes that the facilities of third-party providers at market prices would represent the least cost alternatives for the inter-island fiber optic transmission route that would comprise part of the Middle Mile of a forward-looking and economically efficient network in the U.S. Virgin Islands. Consequently, the USVI BCM incorporates the costs of third party inter-island facilities at the current monthly market price of $35 per Mbps.

Monthly revenue requirement calculations for Middle Mile facilities are calculated using monthly charge factors developed from Vitelco's recent operating results and capital-related inputs. The maintenance and operations expenses portions of revenue requirements reflect the ratio of the each category's operating expenses to the relevant category of plant assets.[7] Loadings for the secondary plant categories of general support assets and materials and supplies are included for capital-related and operating cost calculations. Corporate operations expenses, operating taxes and customer service costs are loaded on the basis of the ratio of each category's expenses to total plant in service. The return of capital components of revenue requirements include allowances for cost of capital, the economic lives of assets, asset salvage values and territory-specific income taxes.[8]

Specific Description: [9]

Tab "Middle Mile Cost"

Description: "Middle Mile Cost" calculates the monthly cost for middle mile electronics and transport using data from the "Last Mile Investment" and "Middle Mile Detail" tabs.

Calculations: "Middle Mile Cost" contains the following calculations:

- Switches, Servers, Controllers, CMTS Equipment (Cells D8:D14): Calculates the investment for these central office equipment facilities on a per HUB basis. The total investment for these facilities, as identified in the "Middle Mile Detail" tab, is divided by the number of HUB locations (7) in the broadband network. The investment of these facilities are allocated equally between HUBs due to the fact that all HUB locations can be served by these facilities through direct and redundant routing.

- Cost per Subscriber (Cells E8:E14): The investment cost per subscriber is calculated by dividing the allocated investment of each HUB by the subscriber locations served by that HUB.

- Central Office Transmission Equipment at Subsea Cable Stations (Cells G8:G14): Calculates the investment in these facilities on a per HUB basis. Edge Router Investment per Subscriber (Cells D7:D82): The total investment for these facilities, as identified in the "Middle Mile Detail" tab, is

[7] To reflect CWF maintenance expense savings from additional underground structure for distribution facilities, the annual charge factor for CWF expenses is reduced to incorporate expected cost savings.

[8] Income tax regulations in the U.S. Virgin Island mirror the U.S. federal tax code. In addition, a Territorial tax surcharge, calculated as 10% of the income tax obligation under the federal code, is assessed in the U.S. Virgin Islands.

[9] As a general guideline, blue color coding in the model indicates an input and green color coding indicates a calculation.

divided by the number of HUB locations (7) in the broadband network. The investment in these facilities is allocated equally between HUBs due to the fact that all HUB locations can be served by these facilities through direct and redundant routing.

- Cost per Subscriber (Cells H8:H14): The investment cost per subscriber is calculated by dividing the allocated investment of each HUB by the subscriber locations served by that HUB.

- The Middle Mile COE section (Excel Columns J8:N14) compiles the Middle Mile COE investment per HUB, including the WDM equipment from the "Middle Mile Detail" tab to calculate total Middle Mile COE investment per subscriber and applies the COE monthly charge factor to calculate the Total Monthly Costs - COE per subscriber.

- Total Monthly Costs COE (Cells N8:N14): Middle Mile COE investment per subscriber x COE monthly charge factor.
- The Middle Mile Transport Facilities Cost section (Cells P8:S14) compiles total CWF transport investment per HUB, as developed in the USVI BCM LAST MILE file, calculates the CWF investment per subscriber and applies the CWF monthly charge factor to calculate the Total Monthly Costs – CWF per subscriber.
- Cable Station Collocation section (Cells U8:V14) compiles the monthly collocation expense per HUB, divides by the number of subscribers served by each HUB to calculate a monthly collocation expense per subscriber.
- Inter-Island Submarine Cable section (Cells X8:Y14) compiles the monthly lease expense per HUB for facilities based on market rates , divides by the number of subscribers served by each HUB to calculate the monthly lease expense per subscriber.
- Total Middle Mile Monthly Cost per Subscriber (Cells: AA8:AA4): Monthly costs per subscriber from each Middle Mile category is summed to calculate the total monthly cost per subscriber by HUB

Tab "Middle Mile Detail"

Description: "Middle Mile Detail" contains the inputs for the development of the Middle Mile Cost, principally the specific investment of COE at the central offices, HUBs and subsea cable stations. This tab also compiles the expenses relate to cable station collocation an inter-island transmission facilities.

The inputs are as follows and include Investment per Unit, number of required units and capacity in Mbps where applicable:

- Softswitches
- Session Border Controllers
- Ethernet switches
- Provisioning servers

- Cable modem termination equipment
- Wavelength-division multiplexing equipment
- Annual subsea cable stations collocation expenses
- Annual lease expenses for inter-island transmission facilities based on market rates

Calculations: "Middle Mile Detail" calculations add the capitalized overhead factor to installed costs of the Middle Mile COE equipment.

Tab "Middle Mile Equipment"

Description: "Middle Mile Equipment" essentially is a reproduction of accounting records that identify specific costs of equipment, shipping, training and vendor support expenses related to Middle Mile COE.

Calculation: Besides line item subtotals at Cells H22, H27, H32, H35 and H44, "Middle Mile Equipment" contains a single calculation at Cell H45 that applies the Broadband/voice allocation factor to CMTS equipment that is used jointly for broadband, voice and video services.

Tab "Middle Mile Collocation Costs"

Description: "Middle Mile Collocation Costs" simply compiles the annual collocation space rental expenses at the subsea cable stations on St. Thomas and St. Croix.

Tab "Middle Mile WDM Equipment - STJ"

Description: "Middle Mile WDM Equipment - STJ" simply compiles the investment in wavelength-division multiplexing equipment on the island of St. John to facilitate transmission of voice and broadband directly to St. Thomas and on to other islands.

Tab "Last Mile Results"

Description: "Last Mile Results" compiles locations, subscriber quantities, loop investment and drop investment quantities from the USVI BCM LAST MILE file.

Calculations: "Last Mile Results" contains only two calculations, apart from the links to the USVI BCM LAST MILE file.

- Drop Investment per Subscriber (Cells F9:F254): Calculates the drop investment per subscriber by dividing total drop investment per Node (from the USVI BCM LAST MILE file) by the number of subscribers taking broadband plus the number of unsupported private lines in each Node.

- Loop Invest per Subscriber (Cells H9:H254): Calculates loop investment per subscriber by dividing total loop investment by Node (from the USVI BCM LAST MILE file) by the number of subscribers taking broadband plus the number of unsupported private lines in each Node
  .
- Total Investment per Subscriber (Cells I9:I254): Calculates total last mile investment per subscriber for each Nose by summing drop investment per subscriber and loop investment per subscriber.
- Monthly Last Mile Cost per Subscriber (Cells J9:J254): Total investment per subscriber x the CWF monthly charge factor.

Broadband Cost Model: USVI BCM RESULTS File: Internet Access

General Description:

Internet access represents the cost of connecting the USVI broadband network through transmission equipment at the cable landing stations where the subsea cables serving the USVI terminate, the cost of obtaining capacity on the subsea cables and the cost of the terrestrial transport and access to peering points located in Miami, Florida, the nearest internet exchange points to the U.S. Virgin Islands.

The per customer location cost of the off-island transport and access to the peering locations is developed using projected costs of two 8.5 Gbps subsea cable systems, one each from the islands of St. Thomas and St. Croix. The costs are made up of two components:

1. The upfront indefeasible rights of use ("IRU") costs allocated over the life of the agreements; and

2. The annual Operations and Maintenance charges as typically specified in IRU agreements.

The costs per customer location reflects the bandwidth requirements for each cable as developed by Vitelco's network engineers under the assumptions that 4 Mbps is available for each customer location, that subscribers utilize 60% of bandwidth while on line, and that 17% of subscribers are on line at peak usage. The cables are sized for Internet/voice traffic only and thus are 100% assignable to broadband/voice services.

Specific Description: [10]

Tab "Internet Access Summary"

[10] As a general guideline, blue color coding in the model indicates an input and green color coding indicates a calculation.

Description: "Internet Access Summary" contains the inputs for the current annual cost associated with two subsea cables connecting the U.S. Virgin Islands with the peering locations in Florida. These costs include the upfront indefeasible rights of use ("IRU") fees and the annual operation and maintenance fees. The inputs for each are as follows:

- IRU Investment
- IRU Term
- Maximum capacity of subsea cable
- Annual operations and maintenance costs

Calculations: "Internet Access Summary" contains the following calculations.

- Annual IRU investment amortization cost for each cable (Cells D14, F14): IRU Investment / IRU term (years).
- Annual IRU Cost for each cable and in total (Cells D19, F19, H19): IRU annual amortization + Annual operations and maintenance cost.
- Total monthly cost for the subsea cables (Cell H21): Total annual cost divided by 12).
- Total subscriber locations (Cell H29): Total customer locations x Take Rate.
- Monthly Cost per Subscriber (Cell H31): Monthly cost for subsea cables x percentage subsea cable used for Internet and voice traffic divided by total broadband customer locations.

"IRU Development"

Description: "IRU Development" contains calculations for the bandwidth capacity requirements of the subsea cables connect the USVI to mainland Internet peering locations. Also, this sheet develops the IRU costs based on existing IRU agreements of Vitelco affiliates and scaling of the terms of those agreements to the capacities necessary for the broadband connections to the mainland.

Calculations: "IRU Development" contains the following calculations.

Section A:

- No. of Broadband Subscribers (Cell D9): Total customer locations x Take Rate.
- Bandwidth Used by Subscribers on line (Cell D12): Total bandwidth per subscriber x Percentage of bandwidth used while on line.

Section B:

- Average Bandwidth Use for Subscribers at Peak (Cell D16): Number of subscribers x Bandwidth used while on line x Percentage of subscribers on line at peak
- Average Bandwidth per Subscriber (Cell D17): Average bandwidth use for subscribers at peak divided by number of subscribers.

- Quantity of STM-16s needed for Peak Bandwidth Requirements (Cell D19): Average bandwidth per subscriber divided by 2.43 Gbps per STM-16.

Section C:

- Cost per Gbps of Existing IRU Arrangement (Cells D25, F25, H25, J25): IRU costs divided by .6075 Gbps per OC-12.
- IRU Cost at OC-48 Bandwidth Capacity (Cells D29, F29, H29, J29): Cost per Gbps at OC-12 x Price variation OC-48 to OC-12 x 4 OC-12s per OC-48.
- Cost per Gbps at OC-48 (Cells D30, F30, H30, J30): IRU cost at OC-48 divided by 2.43 Gbps at OC-48 capacity.
- IRU Cost per Gbps at OC-96 Bandwidth Capacity (Cells D34, F34, H34, J34): Cost per Gbps at OC-48 bandwidth capacity x Price variation OC-96 to OC-48.
- Gbps Bandwidth Requirement per Subsea Cable (Cells: D36, F36, H36, J36): Gbps per STM-16 x Number of ATM-16s required to meet peak usage.
- Total IRU Costs per Subsea Cable (Cells D38, F38, H38, J38): IRU cost per Gbps at OC-96 bandwidth capacity x Gbps capacity requirements of each subsea cable.

Section D:

- Total Cost of Transmission Electronics and Ancillary Equipment at Subsea Cable Stations (Cell D44): Sum of installed equipment cost x Capitalized overhead factor for routers, switches and ancillary equipment.

Broadband Cost Model: USVI BCM LAST MILE File

General Description:

The Last Mile file of the USVI BCM was developed from a Parrish, Blessing & Associates, Inc. Forward-Looking Model ("FLM") that has been used to determine UNE rates in interconnection-related arbitration proceedings for the past sixteen years. The function of the USVI BCM Last Mile file is to estimate the amount of coaxial cable, fiber optic cable and outside plant structures (poles and conduit) that are required to connect all customer locations in the U.S. Virgin Islands to the broadband network.

The USVI BCM is designed to estimate costs for a single jurisdiction and thus does not require the use of a one-size-fits-all approach to network cost estimation. The CACM v3.1 model now under consideration by the Bureau relies on estimation techniques such as measures of road feet and the randomly distributed number of customer locations in a census block to estimate loop distribution plant and plant structure requirements. In contrast, the USVI BCM utilizes the actual distances and actual footage of coaxial cable needed to reach customer locations from the hybrid fiber-coaxial ("HFC") network HUBs. These parameters are compiled from the network design detail developed for the deployment of HFC in an extensive network modernization program currently being implemented by Vitelco. Consequently, it is not necessary for the USVI BCM to employ assumptions and random location algorithms to determine customer locations and related facilities requirements as is the case with the CACM v3.1 because such detailed customer location information is not available.

The actual network design details developed for the Vitelco's network modernization program represent the starting point of the USVI BCM's calculation of Last Mile costs. Actual vendor and contractor price quotes for equipment, installation and training costs related to the network design requirements form the basis for identifying Last Mile capital requirements. These data include the actual coaxial cable footage by cable size (.500, .625, .750 and .825). In all, the actual quantities and unit costs of over 33,700 specific plant components are incorporated into the USVI BCM. Where network design parameters were not available, in 9 of the 246 HFC node locations, the USVI BCM employs design characteristics of similarly situated node locations that were developed from the design parameters of the 237 HFC nodes for which actual specifications were available. In addition to the costs and quantities of these plant components, Vitelco's capitalized overhead measures for engineering, provisioning and transportation are incorporated into the capital requirements.

Capital costs for fiber feeder facilities include installed costs for 288 count fiber cable and reflect route footage developed from the road miles between the HFC HUBs and the serving central offices, including redundancy routes between certain HUBs required for network reliability purposes.

As discussed previously, the USVI BCM assumes that inter-island transmission facilities would be obtained through lease arrangements from a third-party vendor at market prices. The inter-island transmission facilities that connect the HFC HUB on the island of St. John to transmission facilities on St. Thomas, the location of the serving central office, are assumed to be leased at market prices and are incorporated into Last Mile fiber feeder costs.

As is the case for the Middle Mile and Internet access components of the broadband network, monthly revenue requirement calculations for Last Mile facilities are calculated using monthly charge factors developed from Vitelco's recent operating results and capital-related inputs. The maintenance and operations expenses portion of revenue requirements reflect the ratio of the each category's operating expenses, as adjusted for expected efficiencies, to the relevant category of plant assets. Loadings for the secondary plant categories of general support assets and materials and supplies are included for capital-related and operating cost calculations. Corporate operations expenses, operating taxes and billing costs are loaded on the basis of the ratio of each category's expenses to total plant in service. The return of capital components of revenue requirements include allowances for cost of capital, the economic lives of assets, asset salvage values and Territorial-specific income taxes.

Specific Description:[11]

Tab "General Inputs"

Description: "General Inputs" contains inputs for federal and state tax rates, recent period asset and operating expense account balances, the applicable capitalized overhead factor for plant assets, the percentage of network poles owned by Vitelco, the number of local and interstate private lines unsupported by CAF II, the percentage of fiber feeder facilities that require separate underground structure facilities, the expected percent in outside plant maintenance savings related to the deployment of additional underground facilities for loop distribution plant and the ratio of fiber feeder cable footage to fiber feeder structure footage.

Calculations: "General Inputs" a calculation of the gross-up factor for income taxes: (Cell H12): [(Sum of federal tax rate + local surcharge percentage) divided by (1 – (Sum of federal tax rate + local surcharge percentage)] x [(1 – debt ratio) x cost of equity] divided by Allowable after-tax cost of capital.

[11] As a general guideline, blue color coding in the model indicates an input and green color coding indicates a calculation.

Tab "Cable Cost Development"

Description: "Cable Cost Development" contains unit price inputs for components of the Last Mile network and fiber transport network, including:

- Coaxial Cable Investment Per Foot by Cable Size and Structure Type (Does Not Include Costs Related to Structure or Excavation)
- Average Drop Investment Placement and Material Per Line
- Buried divided by Underground Structure Excavation divided by Restoration Per Foot
- Fiber Cable Investment Per Foot for 288 Count Fiber Cable
- Average Investment per 45-foot Pole (in-place cost)
- Annual Net Aerial Structure Sharing Expenses
- Installed Conduit Investment Per Foot for Coaxial and Fiber
- Splice Box divided by Manhole Investment Per Unit
- Monthly Lease Price per Mbps based on market rates
- Multimedia Terminal Adapter per Unit

Calculations: "Cable Cost Development" contains no calculations.

Tab "Cable Development Percentages"

Description: "Cable Development Percentages" contains inputs for the percentage of loop distribution plant cable by structure type, percentage of feeder distribution structure type, and the percentage of the costs of shared structure facilities paid by Telco. The list of inputs is as follows:

- Percentage Loop Distribution Cable by Structure Type by HUB Zone
- Percentage Feeder and Transport Fiber by Structure by HUB Zone and Transmission Route
- Structure Sharing Percentages – Percentage of Structure Costs paid by Telco for Structure Types by HUB Zone and by Fiber Transport Route
- Fiber Cable Sharing Percentages – Percentage of Fiber Cable Costs paid by Vitelco by HUB Zone, Redundancy Routes and Fiber Transport Routes

Calculations: "Cable Development Percentages" contains no calculations.

Tab "Capital Inputs"

Description: "Capital Inputs" calculates the total return, depreciation and return factors for Cable and Wire Facilities (CWF), Central Office Equipment (COE), Support Plant and Materials and Supplies. Inputs to these calculations include the debt ratio, cost of debt, cost of capital and initial dollar cost.

Calculations: "Capital Inputs" contains the following calculations:

- Cost of Equity (Cell E12): Cost of capital minus the product of the debt ratio x cost of debt all divided by one minus the debt ratio.

- Value Period Begin (Cells B38:B72, B79:B113, B120:B154): For year one, the value is the initial dollar cost. For all other years, the value is previous year's value period end.
- Depreciation (Cells C38:C72, C79:C113, C120:C154): Initial dollar value divided by the rounded economic life.
- Value Period End (Cells D38:D72, D79:D113, D120:D154): Value Period Begin minus Depreciation Amount
- Debt Interest Payment (Cells E38:E72, E79:E113, E120:E154): Calculates the interest payment for the year shown in column A assuming an interest rate of the cost of debt, a total period of the rounded economic life, a present value of negative the amount debt financed and a future value of zero.
- Equity Dividend Payment (Cells F38:F72, F79:F113, F120:F154): Calculates the interest payment for the year shown in column A assuming an interest rate of the cost of equity, a total period of the rounded economic life, a present value of negative the amount equity financed and a future value of zero.
- Annual Charge (Cells G38:G72, G79:G113, G120:G154): For all years except the last year of economic life, the depreciation plus the debt interest payment plus the equity dividend payment. For the last year of economic life, the depreciation plus the debt interest payment plus the equity dividend payment less the salvage dollars.
- Annual Charge Difference (Cells H38:H72, H79:H113, H120:H154): The annual charge amount less the average annual charge amount less the adjustment for PV annual charge difference. The average annual charge is calculated as the total annual charge amount for all years divided by the rounded economic life.
- Present Value of Annual Charge Difference (Cells I38:I72, I79:I113, I120:I154): The annual charge difference divided by one plus the cost of capital raised to the year minus one.
- Adjust for Present Value Annual Charge Difference (Cells J38:J72, J76:J113, J120:J154): Calculated using the solver function, as described below.
- Levelized Annual Charge (Cells K38:K72, K79:K113, K120:K154): The total annual charge amount for all years divided by the rounded economic life plus the adjustment for present value annual charge difference.

Solver: The following cells require solver in order to calculate the depreciation and return factors:

- Cell A34: In Cell A34, select "Goal Seek" under "What if Analysis" in the "Data" ribbon in Microsoft Excel 2007. In the "Goal Seek" box, set cell A34 to 0 by changing cell B34.
- Cell A75: In Cell A75, select "Goal Seek" under "What if Analysis" in the "Data" ribbon in Microsoft Excel 2007. In the "Goal Seek" box, set cell A75 to 0 by changing cell B75.
- Cell A116: In Cell A116, select "Goal Seek" under "What if Analysis" in the "Data" ribbon in Microsoft Excel 2007. In the "Goal Seek" box, set cell A116 to 0 by changing cell B116.

Tab "Coax"

Description: "Coax" calculates the coaxial cable and structure investment as well as the investment for amplifiers and accessories, taps and accessories, passives, nodes and accessories, multimedia terminal adapters, power supply equipment, connectors and terminators. Inputs include:

- Number of customer locations passed by the network in each Node zone, including private lines that are unsupported by CAF II.
- Materials costs plus capitalized overheads for all components of amplifiers and accessories required for each Node zone
- Materials costs plus capitalized overheads for all components of taps and accessories required for each Node zone
- Materials costs plus capitalized overheads for all components of passives required for each Node zone
- Materials costs plus capitalized overheads for all components of Nodes and accessories required for each Node zone
- Unit cost of multimedia termination adapters and quantity of subscribers at the assumed take rate for each Node zone
- Materials costs plus capitalized overheads for all components of power supply, connectors and terminators required for each Node zone
- Coaxial cable structure footage for each Node zone
- Percentages of structure footage related to aerial, underground and buried facilities for each HUB zone
- Quantity of poles required for coaxial aerial plant in each Node one
- Average in-place cost per pole
- Percentage of structure cost paid by Vitelco as a result of structure sharing
- Cost per foot for in-place underground conduit
- Cost per foot for excavation divided by restoration related to underground facilities
- Average feet between splice boxes for aerial plant
- Average feet between manholes for underground plant
- Percentage allocation to broadband and voice services of coaxial cable and structure costs for Each HUB zone
- Unit costs for .500, .625, .750 and .825 coaxial cable
- Average cost for in-place drops per location

Calculations: "Coax" contains the following calculations:

- Coax Structure Footage - Aerial (Cells O10:O255): Total structure footage in each Node zone x the aerial structure percentage for the Node zone x the Pole Adjustment Factor.
- Coax Structure Footage - Underground (Cells P10:P255): Total structure footage in each Node zone x the underground structure percentage for the Node zone.

- Coax Structure Footage - Buried (Cells Q10:Q255): Total structure footage in each Node zone x the buried structure percentage for the Node zone.
- Coax Structure Investment – Aerial (Cells R10:R255): [Quantity of poles required for each Node zone per network design specifications x aerial structure percentage for each Node zone x the investment per pole] plus [((Aerial structure footage for each Node zone divided by average footage of cable between splice boxes) x investment per splice box) x the aerial structure sharing percentage for each Node zone] x the Vitelco ownership percentage of network poles.
- Coax Structure Investment – Underground (Cells S10:S255): [Coax underground structure footage required for each Node zone x (per-foot cost of conduit plus per-foot cost for excavation and restoration)] plus [(Underground structure footage for each Node zone divided by average cable footage between manholes) x investment per manhole] x Underground structure sharing percentage for each Node zone.
- Coax Structure Investment – Buried (Cells T10:T255): [Coax buried structure footage required for each Node zone x per foot cost for excavation and restoration] plus [(Buried structure footage for each Node zone divided by average cable footage between manholes) x investment per manhole] x Buried structure sharing percentage for each Node zone.
- Total Allocable Coaxial Cable Footage (Cells V10:V255): Total coaxial cable footage for each Node zone x percentage of coaxial cable allocable to broadband and voice services
- Allocable Coaxial Cable Footage – Aerial (Cells W10:W255): Total allocable coaxial cable footage for each Node zone x aerial distribution structure sharing percentage.
- Allocable Coaxial Cable Footage – Underground (Cells X10:X255): Total allocable coaxial cable footage for each Node zone x underground distribution structure sharing percentage.
- Allocable Coaxial Cable Footage – Buried (Cells Y10:Y255): Total allocable coaxial cable footage for each Node zone x buried distribution structure sharing percentage.
- Coax Cable Footage by Cable Size – Aerial (Cells Z10:Z255, AA10:AA255, AB10:AB255, AC10:AC255): Allocable aerial cable footage x (percentages of coaxial aerial cable for sizes .500, .625, .750, .825, respectively).
- Coax Aerial Cable Investment by Cable Size (Cells (Cells AD10:AD255, AE10:AE255, AF10:AF255, AG10:AG255): Cable footage for cable sizes .500, 625, .750, .825, respectively x coax cable unit costs by cable size x Percentage of coaxial cable investment allocable to broadband and voice services.
- Coax Cable Footage by Cable Size – Underground AH10:AH255, AI10:AI255, AJ10:AJ255, AK10:AK255): Allocable underground cable footage x (percentages of coaxial underground cable for sizes .500, .625, .750, .825, respectively).
- Coax Underground Investment by Cable Size (Cells AL10:AL255, AM10:AM255, AN10:AN255, AO10:AO255): Underground cable footage for cable sizes .500, 625, .750, .825, respectively x coax cable unit costs by cable size x Percentage of coaxial cable investment allocable to broadband and voice services.
- Coax Cable Footage by Cable Size – Buried AP10:AP255, AQ10:AQ255, AR10:AR255, AS10:AS255): Allocable buried cable footage x (percentages of coaxial underground cable for sizes .500, .625, .750, .825, respectively).

- Coax Buried Investment by Cable Size (Cells AT10:AT255, AU10:AU255, AV10:AV255, AW10:AW255): Buried cable footage for cable sizes .500, 625, .750, .825, respectively x coax cable unit costs by cable size x Percentage coaxial cable allocable to broadband and voice services.
- Network Drop/Terminal Investment – Aerial (Cells AY10:AY255): [(Total locations passed x take rate) x average cost per drop] plus private lines unsupported by USF x average cost per drop.
- Coax Investment – Structure and Cable (Cells BB10:BB255): Sum of Investment for amplifiers and accessories, taps and accessories, passives, nodes and accessories, MTAs, power supply equipment, connectors, terminators, coaxial cable structure investment, coax cable investment and network drop/terminal investment.

Tab "Fiber"

Description: "Fiber" calculates the fiber cable and structure investment. One input, Total Locations (aggregated by HUB zone) is taken from the "Coax" tab. Additional inputs include:

- Route distances for direct routes between HB locations and serving central offices
- Route distances between certain HUB locations for network redundancy purposes
- Route distances from serving central offices to cable stations
- Bandwidth capacity requirements for inter-island transmission facilities
- Percentages of fiber structure footage related to aerial, underground and buried facilities for each HUB zone
- Percentage of structure cost paid by Telco as a result of structure sharing
- Cost per foot for in-place underground conduit
- Cost per foot for excavation/restoration related to underground facilities
- Average feet between splice boxes for aerial plant
- Average feet between manholes for underground plant
- Percentage allocation to broadband and voice services of coaxial cable and structure costs for Each HUB zone
- Cost per foot for 288 count fiber cable
- Percentage allocation to broadband and voice services of fiber cable costs for Each HUB zone and for each fiber transport route
- Percentage of Feeder Redundancy Routes that Require Structure Facilities
- Ratio of Fiber Feeder Cable footage to Fiber Feeder Structure footage

Calculations: "Fiber" contains the following calculations:

- Fiber Transport Structure Footage - Aerial (Cells L19:L20): Fiber transport structure footage by route x aerial feeder structure percentages.
- Fiber Transport Structure Footage – Underground (Cells M19:M20): Fiber transport structure footage by route x underground feeder structure percentages.
- Fiber Transport Structure Footage – Buried: (Cells N19:N20): Fiber transport structure footage by route x buried feeder structure percentages.

- Fiber Transport Structure Investment – Aerial (Cells O19:O20): [(Fiber aerial structure footage divided by average feet of fiber cable between poles) x investment per pole] x Aerial transport structure sharing percentage.
- Fiber Transport Structure Investment – Underground (Cells P19:P20): Fiber underground structure footage required for each Node zone x (per foot cost of conduit plus per foot cost for excavation and restoration)] plus [(Fiber underground structure footage for each Node zone divided by average fiber footage between manholes) x investment per manhole] x Underground transport structure sharing percentage.
- Fiber Transport Structure Investment – Buried (Cells Q19:Q20): Fiber buried structure footage required for each Node zone x (per foot cost for excavation and restoration] plus [(Buried structure footage for each Node zone divided by average footage between manholes) x investment per manhole] x Buried transport structure sharing percentage.
- Fiber Feeder Structure Footage - Aerial (Cells S10:S18): Fiber feeder structure footage by route x aerial structure percentages.
- Fiber Feeder Structure Footage – Underground (Cells T10:T18): Fiber feeder structure footage by route x underground structure percentages.
- Fiber Feeder Structure Footage – Buried: (Cells U10:U18): Fiber feeder structure footage by route x buried structure percentages.
- Fiber Feeder Structure Investment – Aerial (Cells V10:V18): [(Fiber feeder aerial structure footage divided by average feet between poles) x investment per pole] x the Vitelco pole ownership factor.
- Fiber Feeder Structure Investment – Underground (Cells W10:W18): Fiber feeder underground structure footage x (per foot cost of conduit plus per foot cost for excavation and restoration)] plus [(Fiber underground structure footage for each Node zone divided by average fiber footage between manholes) x investment per manhole]. Fiber Feeder Structure Investment – Buried (Cells X10:X18): Fiber feeder buried structure footage required for each Node zone x per foot cost for excavation and restoration] plus [(Buried structure footage for each Node zone divided by average fiber footage between manholes) x investment per manhole].
- Fiber Feeder Cable Footage - Aerial (Cells AA10:AA18): Fiber feeder cable footage by route x aerial feeder structure percentages.
- Fiber Feeder Cable Footage – Underground (Cells AB10:AB18): Fiber feeder cable footage by route x underground feeder structure percentages.
- Fiber Feeder Cable Footage – Buried: (Cells AC10:AC18): Fiber feeder cable footage by route x buried feeder structure percentages.
- Fiber Feeder Cable Investment – Aerial (Cells AD10:AD18): Fiber feeder aerial cable footage x fiber cable cost per foot x fiber cable sharing percentage.
- Fiber Feeder Cable Investment – Underground (Cells AE10:AE18): Fiber feeder underground cable footage x fiber cable cost per foot x fiber cable sharing percentage.
- Fiber Feeder Cable Investment – Buried (Cells AF10:AF18): Fiber feeder buried cable footage required for each Node zone x fiber cable cost per foot x fiber cable sharing percentage.

- Fiber Transport Cable Footage - Aerial (Cells AH19:AH20): Fiber transport cable footage by route.
- Fiber Transport Cable Footage – Underground (Cells AI19:AI20): Fiber transport cable footage by route.
- Fiber Transport Cable Footage – Buried: (Cells AJ19:AJ20): Fiber transport cable footage by route.
- Fiber Transport Cable Investment – Aerial (Cells AK19:AK20): Fiber transport aerial cable footage x fiber cable cost per foot x fiber cable sharing percentage.
- Fiber Transport Cable Investment – Underground (Cells AL19:AL20): Fiber transport underground cable footage x fiber cable cost per foot x fiber cable sharing percentage.
- Fiber Transport Cable Investment – Buried (Cells AM19:AM20): Fiber transport buried cable footage x fiber cable cost per foot x fiber cable sharing percentage.
- Inter-Island Submarine Cable Lease Costs per Month (Cells AP21:AP23): Inter-Island Route Bandwidth Capacity Requirements x Monthly Price per Megabit.
- Total Loop Fiber Investment – Structure and Cable (Cells AR10:AR18): Sum of Fiber Loop Feeder Structure Investment and Fiber Loop Feeder Cable Investment.
- Total Fiber Transport Investment – Structure and Cable (Cells AS19:AS20): Sum of Fiber Transport Structure Investment and Transport Fiber Cable Investment.

Tab "Loop Cost"

Description: "Loop Cost" calculates the monthly revenue requirement per line for each Network Node. A number of inputs are taken from the "Coax" and "Fiber" tabs. These include:

- Coaxial Network Structure, Cable Investment and Electronics Investment
- Fiber Feeder Structure and Cable Investment
- Subscribers including Local Private Lines unsupported by CAF II
- Inter-Island Submarine Cable Lease Expense
- Net Aerial Structure Expense per subscriber per month

Calculations: "Loop Cost" contains the following calculations:

- Loop Feeder Fiber Investment per Node (Cells E11:E256): Divides the total fiber feeder investment for each HUB zone by the quantity of Nodes in that zone plus the total fiber feeder investment for redundancy routes divided by the total quantity of network Nodes.
- Loop Investment per Subscriber Location including Private Lines unsupported by CAF II (Cells H11:H256): Divides the sum of total coaxial network investment and the fiber feeder investment for each Node by the quantity of subscriber locations in that Node, including private lines unsupported by CAF II.
- Annual Revenue Requirements per Subscriber Location (Cells I11:I256): Investment per subscriber location x the Annual Cost Factor for CWF.

- Submarine Cable Lease Monthly Expense per Subscriber Location in the Pastory HUB zone (Cells: J236:J256) and CHE Water Island Hub zones (Cells J37:J38): Divides the monthly lease expense by the quantity of subscriber locations.
- Net Additional Aerial Structure Expense per Subscriber Location (Cells: J11:J256): [((Divides the locations in each Node by the total network locations) x the annual net additional aerial cable expense divided by 12 divided by subscriber locations to calculate the monthly expense per subscriber location.
- Total Monthly Revenue Requirement per Subscriber Location (Cells: K11:K256): Annual loop investment revenue requirement per subscriber location by divided 12 plus monthly submarine cable lease expense per subscriber locations plus net additional aerial structure expense per subscriber location.

Tab "Transport"

Description: "Transport" sums the total transport investment for the network. A number of inputs are taken from the "Fiber" tab. These include:

- Aerial Placement, Owned Poles, and Conduit for Fiber
- Aerial Fiber Cable Investment
- Underground Placement, Owned Poles, and Conduit for Fiber
- Underground Fiber Cable Investment
- Buried Placement, Owned Poles, and Conduit for Fiber
- Buried Fiber Cable Investment

Calculations: "Transport" contains the following calculations:

- Aerial Transport Structure Investment (Cell D13): Sum of Column O in "Fiber" tab.
- Underground Transport Structure Investment (Cell E 13): Sum of Column P in "Fiber" tab.
- Buried Transport Structure Investment (Cell F13): Sum of Column Q in "Fiber" tab.
- Total Structure Investment for Transport (Cell G13): Sum of Aerial, Underground and Buried Structure Investment for Transport Routes.
- Aerial Fiber Cable Investment for Transport (Cell D14): Sum of Column AK in "Fiber" tab.
- Underground Fiber Cable Investment for Transport (Cell E14): Sum of Column AL in "Fiber" tab.
- Buried Fiber Cable Investment for Transport (Cell F14): Sum of Column AM in "Fiber" tab.
- Total Structure Investment for Transport (Cell G12): Sum of Aerial, Underground and Buried Structure Investment for Transport Routes.
- Total Transport Fiber Cable Investment (Cell G13): Sum Aerial, Underground and Buried Transport Fiber Cable Investment.
- Total Transport Structure and Fiber Cable Investment (Cell G14): Sum Transport Structure Investment and Transport Fiber Cable Investment.
- Total Fiber Cable Investment - Underground (Cell E14): Sum of Aerial, Underground and Buried Total Cable and Placement Investment

Tab "ACF's"

Description: "ACF's" calculates the annual cost factors. Inputs for this tab are pulled from the "General Inputs" and "Capital Inputs" tab. These include:

Vitelco account balances for the fiscal year ended May 31, 2012.

Acct. 2001 – Telephone Plant in Service
Acct. 1220 Materials & Supplies
Accts. 2110/2120 General Support Assets
Acct. 2210 COE Switching Assets
Acct. 2220 COE Operator Equipment
Acct. 2230COE Transmission Equipment
Acct. 2410 Cable &Wire Facilities
Acct. 6110 Network Support Expenses
Acct. 6120 General Support Expenses
Accts. 6210, 6220, 6230 COE Expenses
Acct. 6410 Cable & Wire Facilities Expenses
Acct. 6530 Network Operations Expenses
Acct. 6710, 6720 Corporate Operations Expenses
Acct. 7200 - Operating Taxes
CABS Billing Expenses

Calculations: "ACF's" contains the following calculations:

- CWF Maintenance Factor (Cell E28): Calculated as CWF expenses divided by CWF investment x CWF Maintenance Expense Savings Factor.
- COE Maintenance Factor (Cell E29): Calculated as COE expenses divided by COE investment for switching, operations and transmission.
- GSF Maintenance Factor (Cell E30): Calculated as network and general support expenses divided by general support assets.
- Netw. Supp. & Gen. Supp. Factor (Cell E31): Calculated as network and general support expenses divided by total plant in service.
- Network Operations Factor (Cell E33): Calculated as network operations expenses divided by total plant in service.
- Corporate Operations Factor (Cell E41): Calculated as corporate operations expenses divided by total plant in service.
- Operating Taxes Factor (Cell E43): Calculated as operating taxes divided by total plant in service.
- Customer Service Factor (Cell E45): Calculated as customer service expenses divided by total plant in service.
- Secondary Investment Factors – Support Plant (Cell E54): Calculated as general support assets divided by total plant in service less general support assets.

- Secondary Investment Factors – Materials and Supplies (Cell E55): Calculated as materials and supplies assets divided by total plant in service.
- Direct Expense (Cells D60:D66, E60:E66): Calculated as the sum of the Expenses Factors.
- Support Plant Depreciation (Cells D68:E68): Calculated as the product of Support Investment Factor and Support Plant Depreciation Factor.
- Total Expenses (Cells D69:E69): Calculated as the sum of Direct Expenses and Support Plant Depreciation.
- Direct Return Factor (Cells D71:E71): CWF & COE Return Factors from Capital Inputs.
- Support Plant Return Factor (Cells D72:E72): Calculated as the product of Support Investment Factor and Return Factor.
- Materials & Supplies Return Factor (Cells D73:E73): Calculated as the product of Materials & Supplies Investment Factor and Return Factor.
- Total Return Factor (Cells D74:E74): Calculated as the sum Direct, Support Plant and Materials & Supplies Return Factors.
- Income Tax Gross-up (Cells D77:E77): Calculated as the product of the Total Return Factor and the Income Tax Gross-up Factor.
- Annual Cost Factor (Cells D79:E79): Calculated as the sum of Total Expenses, Total Return and Income Tax Gross-up.
- Monthly Cost Factor (Cell D81:E81): Annual Cost Factor divided by 12.